

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A system comprising:
a first component that generates heat; and
a plurality of second components that are is thermally connected to the first component;
wherein the heat from the first component is transferred to a coolant through the second components;
each ~~the~~ second component has a function in the system associated with an operation of the system other than transferring heat; and
the second component directly interacts with the coolant.
2. (Original) The system of claim 1, wherein the first component comprises a plurality of first components, each of which generates heat.
3. (Currently Amended) The system of claim 1, wherein a function of a ~~the~~ second component of the ~~comprises a~~ plurality of second components, ~~each of which has an~~ is the same as a function of another second component of the plurality of second components.
4. (Currently Amended) The system of claim 1, wherein each ~~the~~ second component comprises:
a cooling solution for transferring heat to the coolant.
5. (Currently Amended) The system of claim 1, wherein the system is a computer system and each ~~the~~ second component is selected from the group consisting of:
a memory module, a dual-inline memory module, a single-inline memory module, a RAM memory module, a ROM memory module.

6. (Original) The system of claim 1, wherein the system is a computer system and the first component is selected from the group consisting of:

a processor, a memory controller, an I/O controller, a cache chip, a crossbar chip, and an integrated circuit device that generates more heat than that which can be transferred by a packaging of the device.

7. (Original) The system of claim 1, wherein the coolant is air.

8. (Currently Amended) The system of claim 1, wherein each ~~the~~ second component operates as a heat sink fin for the ~~at least one~~ first component.

9. (Currently Amended) The system of claim 1, wherein each ~~the~~ second component is connected to one side of a board and the first component is connected to another side of the board.

10. (Currently Amended) The system of claim 1, further comprising:
a first board that supports the first component; and
a second board that supports each ~~the~~ second components and is thermally connected to each ~~the~~ second components, and is connected to the first board;
wherein a portion of the second board is thermally connected to the first component.

11. (Original) The system of claim 10, wherein the second board is removably attached to the first board.

12. (Original) The system of claim 10, wherein the first board and the connected second board are removably connected to the system.

13. (Original) The system of claim 10, further comprising:
a ball grid array that is used to connect the first component to the first board.

14. (Original) The system of claim 10, further comprising:
a conformal thermal transfer material that located between the second board and the first component.

15. (Currently Amended) ~~The system of claim 10, further comprising:~~

A system comprising:

a first component that generates heat;

a second component that is thermally connected to the first component;

wherein the heat from the first component is transferred to a coolant through the second component;

the second component has a function in the system associated with an operation of the system other than transferring heat;

the second component directly interacts with the coolant;

a first board that supports the first component;

a second board that supports the second component and is thermally connected to the second component, and is connected to the first board;

wherein a portion of the second board is thermally connected to the first component;
and

at least one support that is located on the periphery of the first component and protects the first component from forces exerted on the second board.

16. (Currently Amended) ~~The system of claim 10, further comprising:~~

A system comprising:

a first component that generates heat;

a second component that is thermally connected to the first component;

wherein the heat from the first component is transferred to a coolant through the second component;

the second component has a function in the system associated with an operation of the system other than transferring heat;

the second component directly interacts with the coolant;

a first board that supports the first component;

a second board that supports the second component and is thermally connected to the second component, and is connected to the first board;

wherein a portion of the second board is thermally connected to the first component;

at least one support that is located on the periphery of the first component and protects the first component from forces exerted on the second board; and

wherein the at least one support surrounds the first component and is connected with the first board and the second board so as to form an electromagnetic interference shield that reduces interference between the first component and an environment external to the first component.

17. (Currently Amended) ~~The system of claim 10, further comprising:~~

A system comprising:

a first component that generates heat;

a second component that is thermally connected to the first component;

wherein the heat from the first component is transferred to a coolant through the second component;

the second component has a function in the system associated with an operation of the system other than transferring heat;

the second component directly interacts with the coolant;

a first board that supports the first component;

a second board that supports the second component and is thermally connected to the second component, and is connected to the first board;

wherein a portion of the second board is thermally connected to the first component;

at least one support that is located on the periphery of the first component and protects the first component from forces exerted on the second board; and

wherein the second component comprises a plurality of memory modules and the second board further comprises:

at least one memory module connector, each of which is associated with a memory module of the plurality of memory modules, and connects its associated memory module to the second board.

18. (Currently Amended) The system of claim 10, wherein at least one ~~the~~ second component comprises a memory module, and the at least one memory module is directly attached to the second board.

19. (Currently Amended) The system of claim 10, wherein at least one ~~the~~ second component comprises a memory module, and the at least one memory module is directly attached to the second board;

wherein the memory module is attached at a 45 degree angle with respect to a surface of the second board.

20. (Currently Amended) The system of claim 10, wherein at least one ~~the~~ second component comprises a memory module, and the memory module is directly attached to the second board;

wherein the memory module is attached at a 90 degree angle with respect to a surface of the second board.

21. (Currently Amended) The system of claim 10, further comprising:

a plurality of devices that are attached to the second board;

wherein the plurality of devices are connected to vias in the second board, whereby the vias conduct heat from ~~the~~ at least one component to ~~the~~ at least one memory module.

22. (Original) The system of claim 10, further comprising:

a plurality of devices that are attached to the second board;

wherein the devices are bus terminators.

23. (Currently Amended) ~~The system of claim 10, further comprising:~~

A system comprising:

a first component that generates heat;

a second component that is thermally connected to the first component;

wherein the heat from the first component is transferred to a coolant through the second component;

the second component has a function in the system associated with an operation of the system other than transferring heat;

the second component directly interacts with the coolant;

a first board that supports the first component;

a second board that supports the second component and is thermally connected to the second component, and is connected to the first board;

wherein a portion of the second board is thermally connected to the first component;

a plurality of devices that are attached to the second board; and

wherein the plurality of devices are located with a first portion on one side of the second board and the first component is thermally connected to a second portion on the opposite side of the second board.

24. (Currently Amended) ~~The system of claim 10, further comprising:~~

A system comprising:

a first component that generates heat;

a second component that is thermally connected to the first component;

wherein the heat from the first component is transferred to a coolant through the second component;

the second component has a function in the system associated with an operation of the system other than transferring heat;

the second component directly interacts with the coolant;

a first board that supports the first component;

a second board that supports the second component and is thermally connected to the second component, and is connected to the first board;

wherein a portion of the second board is thermally connected to the first component;

a plurality of devices that are attached to the second board;

wherein the plurality of devices are located with a first portion on one side of the second board and the first component is thermally connected to a second portion on the opposite side of the second board; and

the first portion and the second portion are adjacent to each other.

25. (Currently Amended) ~~The system of claim 10, further comprising:~~

A system comprising:

a first component that generates heat;

a second component that is thermally connected to the first component;

wherein the heat from the first component is transferred to a coolant through the second component;

the second component has a function in the system associated with an operation of the system other than transferring heat;

the second component directly interacts with the coolant;

a first board that supports the first component;

a second board that supports the second component and is thermally connected to the second component, and is connected to the first board;

wherein a portion of the second board is thermally connected to the first component;

a plurality of devices that are attached to the second board;

wherein the plurality of devices are located with a first portion on one side of the second board and the first component is thermally connected to a second portion on the opposite side of the second board; and

the first portion is peripherally located on the second board with respect to one axis of the second board, and the second portion is centrally located on the second board with respect to the one axis.

26. (Currently Amended) A method for cooling a first component of a system that generates heat, comprising:

providing a plurality of second components in the system that have ~~has~~ a function associated with an operation of the system other than transferring heat;

thermally connecting ones of the second components to the first component, whereby heat generated by the first component is transferred to a plurality of ~~the~~ second components; and

transferring heat directly from the second components to a coolant.

27. (Currently Amended) A method for cooling a first component of a system, comprising:

generating heat by the first component;

transferring heat from the first component to a plurality of second component[s] in the system that have ~~has~~ a function associated with an operation of the system other than transferring heat; and

transferring heat from the second component[s] directly to a coolant.

28. (Previously Amended) A device for transferring heat from a system comprising:

a first portion for connecting a first component that has a function associated with an operation of the system other than transferring heat;

a second portion for thermally connecting a second component that generates heat;

a third portion for connecting the first portion to the system, thereby enabling the function of the first component; and

a thermal conduction path between the first portion and the second portion, whereby heat from the second component can be transferred to the first component, and the heat is transferred directly from the first component to a coolant for dissipation.

29. (Previously Amended) A system comprising:

a component that generates heat; and

means for receiving the heat from the component, interacting with a coolant to transfer the heat to the coolant, and performing a function in the system associated with an operation of the system other than transferring the heat.